6.2.4 & 7.2.1 Classwork

Name_____ Date_____

How can I solve exponential equations?
Using logarithms to solve exponential functions

Today's big goal You will figure out what a graphing calculator can and cannot do with logs. This will help you write a general equation for a log function. As you work with your team, use the following questions to help focus your discussions.

What is a log?

How are logarithms and exponential equations related to each other?

How can we find an equivalent exponential equation for an equation that is in log form?

6-93 Solve the log mystery!

Have you noticed the LOG key on your calculator? Clearly it is a logarithm, but what is its base? It would have been nice if the designers of your graphing calculator had allowed the LOG key to work with any base, but they did not!

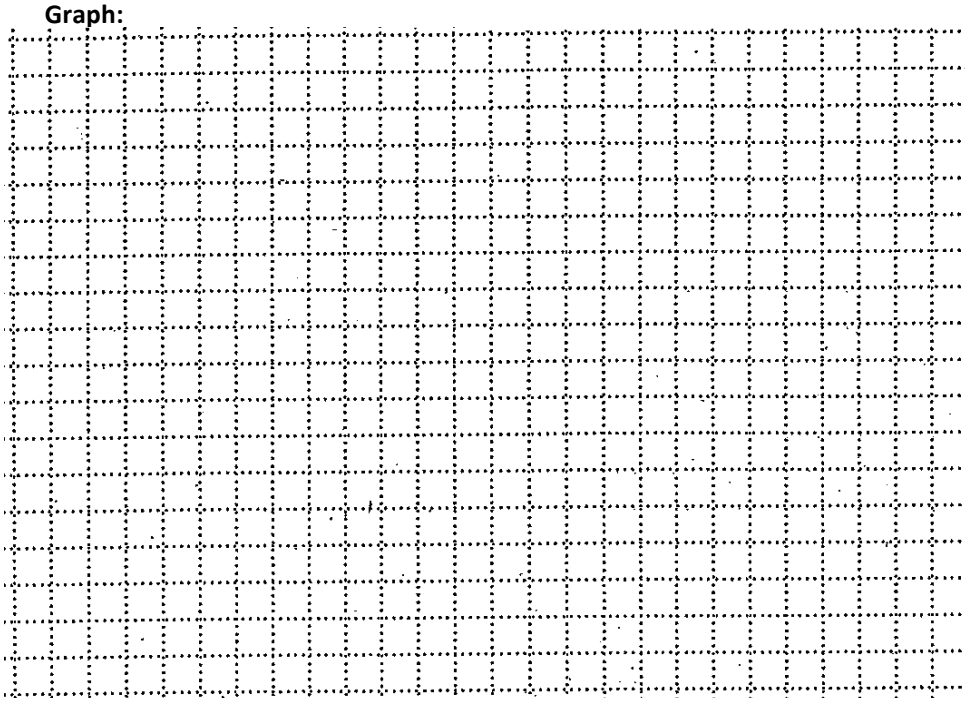
Your task: Find the base of the LOG key on your calculator. With your team, start by gathering some data and making a table for $y = \log x$. Analyze your data, and when you are sure you have figured out the base, write a clear summary statement **justifying** your conclusion.

Equation: $y = \log x$ ➔ *When finished with the table & graph, rewrite this equation in exponential form:* _____

Table:

x	y
	0
	1
	2
	3
	4
	5

Graph:



Summary Statement:
These values tell us that the base of log x is _____. We know this because…

6-95

You have learned a lot about logs in a short time. Use what you have learned so far to answer the questions below.

a. Why does your calculator say that log (6) = 0.778?

b. **Justify** why log (6) must have a value less than 1 but greater than 0.

c. Learning Log

What is a log?

How are logarithms and exponential equations related to each other?

How can you find an equivalent exponential equation for an equation that is in log form?

How can you transform log functions?

7-87 Logarithms so far

There are two important log facts you have worked with so far. **Discuss** these questions with your team to ensure everyone remembers these ideas. For each problem, **make up an example** to illustrate your ideas.

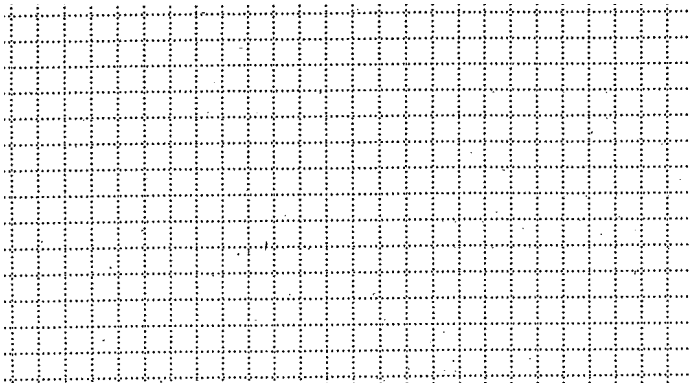
a. What is a logarithm? How can log equations be converted into another form?

b. What do you know about the logarithm key on your calculator?

7-88

Have your TASK MANAGER read aloud from your e-book.

a. Show that the two equations are different by using what you learned in previous lessons to **sketch** the graph of $y = \log_2 x$. Then **sketch** what your graphing calculator shows to be the graph of $y = \log(2^x)$



b. Now show that $y = \log_2 x$ and $y = \log(2^x)$ are different by converting both of them to exponential form.

Log Form: $y = \log_2 x$
Exponential Form: _____

Log Form: $y = \log(2^x)$
Exponential Form: _____

7-89 Have your FACILITATOR read aloud.

The work you did in problem 7-88 is a **counterexample**, which shows that in general, the statement $\log_b x = \log(b^x)$ is *false*.

For each of the following log statements, use the **strategies** from problem 7-88 to determine whether they are true or false, and **justify** your answer. Be ready to present your conclusions and **justifications**.

a. $\log_5(25) \stackrel{?}{=} \log_{25}(5)$

Circle one: True or False
How do you know? Justify your answer.

b. $\log(x^2) \stackrel{?}{=} (\log x)^2$

Circle one: True or False
How do you know? Justify your answer.

c. $\log(7^x) \stackrel{?}{=} x \log(7)$

Circle one: True or False
How do you know? Justify your answer.

d. $\log(2x) \stackrel{?}{=} \log_2 x$

Circle one: True or False
How do you know? Justify your answer.

7-90 Have your TASK MANAGER read aloud.

In the previous problem, only *one* of the statements was true.

a. Use different numbers to make up four more statements that follow the same pattern as the one true statement, and test each one to see whether it appears to be true.

b. Use your results to complete the following statement, which is known as the

Power Property of Logs

$\log(b^x) =$ _____

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7-91 Have your REPORTER/RECORDER read aloud.

Do you remember solving problems like $1.04^x = 2$ in your homework? What method(s) did you and your teammates use to find *x*?

In tonight's homework there are several more of these problems. (You probably wish there were a more efficient way!)

7-92 There Must be an Easier Way

a. What makes the equation $1.04^x = 2$ so hard to solve?

b. Surprise! In the first part of this lesson, you already found a method for getting rid of inconvenient exponents! Talk with your team about how your results from 7-89 and 7-90 can help you rewrite the equation $1.04^x = 2$. Be prepared to share your ideas with the class.

c. Solve $1.04^x = 2$ using this new method. Be sure to check your answer.

7-92 **Solve the following equations. Be sure your answers are accurate to three decimal places and also be sure to check your answers.**

1.	2.
3.	4.
5.	6.
7.	8.